# Self-rated Health as a Predictor of Hospital Admission and Nursing Home Placement in Elderly Public Housing Tenants

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**Abstract:** We assessed the validity of self-rated health in a one-year prospective study of 155 elderly public housing tenants. Compared to studies of elderly community residents, tenants had poorer self-rated health, and higher hospital admission and nursing home placement rates. Poor self-rated health was a risk factor for both outcomes. We conclude that self-rated health may be useful in identifying persons at increased risk for hospital admission and nursing home placement. (*Am J Public Health* 1986; 76:457–459.)

*Introduction*

Single questions requesting respondents to rate their own health may be the most commonly used method to obtain an overall health assessment. This approach considers not only objective health, but also reflects the effects of any objective medical problems on individuals' everyday activities.[1] Among elderly persons, self-rated health has correlated with physician assessments,[2] mortality,[3] number of physician visits, days in bed, and hospital days.[4]

We studied self-reported health in elderly public housing tenants, persons whose age and income level place them at-risk for hospital admission[5] and nursing home (NH) placement.[6] We hypothesized that: 1) tenants have worse self-reported health, and higher hospital and NH admission rates than similarly-aged community residents; and 2) poor self-reported health is a risk factor for hospitalization and NH placement.

*Methods*

As an on-site health center opened at a single public housing site, we invited all tenants to be interviewed with the mid-length Multilevel Assessment Instrument (MAI),[7] which computes scores in seven areas (Table 1), and the Center for Epidemiological Studies Depression (CES-D) scale.[8–11] Only those tenants viewed as incompetent or too sick to be interviewed were excluded. A detailed methodology is reported elsewhere.[12]

Health status was measured by respondents' CES-D scores and answers to three questions from the MAI: an overall health rating (4 = excellent, 3 = good, 2 = fair, 1 = poor); whether health problems were barriers to activities (3 = not at all, 2 = a little, 1 = a great deal); and health compared to others their age (3 = better, 2 = same, 1 = not as good). We used two-tailed t-tests to compare means in our sample with a national survey on depression[11] and previous studies of elderly community residents.[1,13]

Through computerized and manual chart audits, we identified persons hospitalized and/or placed in NHs during the year following baseline assessments. Since we could not validate these outcomes in nonusers of the health center, we excluded them from analyses. To examine potential biases, we used t-tests to compare users' and nonusers' demographic characteristics, self-reported health status, and MAI domain scores. We estimated expected hospital admission[5] and NH placement rates[6,14] given our sample's age distribution (our sample size did not permit direct standardization) and used Z-tests to compare rates in our sample with national estimates.

We identified univariate risk factors for each outcome variable using two-tailed t-tests. To determine if individual health status measures could independently predict hospital admission and NH placement, we used stepwise logistic regression[15] with age, race, sex, and education forced into the equation as covariates. The final analyses considered all four health status measures in a stepwise fashion.

*Results*

We conducted MAI/CES-D interviews with 196 of 257 (76.3 per cent) tenants: five tenants who were unable to complete the interview and four who were younger than 45 years were excluded from the analyses. Of those tenants not interviewed, 22 could not be contacted, eight were incompetent or too ill, and 31 refused, primarily because they did not plan to use the health center.

Thirty-two respondents did not use the health center; there were no differences between users and nonusers (Table 1). The mean age of the 155 health center users was 71.4 years, half were White, 70.3 per cent were female, and their mean educational level was 9.1 years.

All self-reported health measures in our public housing sample were significantly worse than elderly community residents (Table 2). In our sample, 36 persons were younger than 65, and 119 were 65 years or more; noninstitutionalized Americans in these two age groups have annual hospital admission rates of .143 and .201, respectively.[5] Based solely on age, 18.7 per cent of the tenants would have been hospitalized. In our sample, 68 (43.8 per cent) were admitted in one year. Also, 16 tenants (10.3 per cent) were placed in NHs during the study period, substantially more than the expected rate of 1.50 per cent.

Hospitalized tenants were significantly more likely to be depressed, report worse physical health, and perceive their health as interfering with their activities, even when controlling for sex, age, race, and education (Table 3). Examination of indicator variables beta coefficients showed that we could assume interval level data if excellent and good overall health ratings were combined into one category, and the health as a barrier variable was dichotomized as interfering a great deal or not. In the multivariate model, no improvement could be made on the model which considered health as a barrier, although overall health was nearly significant ($p = .069$). This model separated persons at low-risk (N = 87) and high-risk (N = 68) for admission; their admission rates were 31.0 per cent and 60.2 per cent, respectively ($\chi^2 = 12.11$, $p = .0005$).

Persons placed in NHs were older, had worse overall health ratings, and reported that health problems interfered

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**TABLE 1—Means and Standard Deviations of MAI Domain Scores, Demographic Characteristics, and Self-reported Health Status: Health Center Users and Non-users**

| Variables | Nonusers (N= 32) | Users (N = 155) |
|---|---|---|
| Demographic Characteristics | | |
| Age (years) | 72.38 ± 10.93 | 71.43 ± 9.59 |
| Education (years) | 9.19 ± 3.30 | 9.09 ± 2.74 |
| Race (% White) | 46.9 | 50.3 |
| Sex (% Female) | 75.0 | 70.3 |
| Live Alone | 91.5 | 82.3 |
| MAI Domain Scores | | |
| Physical Health | 15.03 ± 2.43 | 14.12 ± 2.42 |
| Social Support | 16.44 ± 4.99 | 16.32 ± 5.65 |
| Cognition | 4.50 ± 0.88 | 4.50 ± 0.82 |
| Time Use | 16.38 ± 6.89 | 16.76 ± 6.52 |
| Environmental | 11.48 ± 2.00 | 11.99 ± 1.70 |
| Activities of Daily Living | 10.72 ± 1.46 | 10.45 ± 2.02 |
| Psychological Adjustment | 3.97 ± 1.45 | 3.72 ± 1.34 |
| Health Status Measures | | |
| CES-D Score (Depression) | 9.91 ± 9.93 | 10.22 ± 9.60 |
| Overall Health Status | 2.41 ± 0.91 | 2.17 ± 0.91 |
| Health as a Barrier | 2.19 ± 0.90 | 1.99 ± 0.84 |
| Health Compared to Others | 2.47 ± 0.72 | 2.21 ± 0.77 |

NOTE: High CES-D scores indicate more depressive symptoms. For other health status measures, higher scores reflect better health. There were no significant ($p < .05$) differences.

**TABLE 2—Health Status Measures: Public Housing Tenants versus Community Group**

| Health Status Measures | Public Housing Tenants (N = 155) | Community Group |
|---|---|---|
| Overall Health[a] | 2.17 ± 0.91 | 2.63 ± 0.89† |
| Health as Barrier[a] | 1.99 ± 0.84 | 2.15 ± 0.81* |
| Health Compared to Others[b] | 2.21 ± 0.77 | 2.54 ± 0.76† |
| CES-D (Depression)[c] | 10.22 ± 9.60 | 8.70 ± 8.40* |

[a]Community Comparison group: Fillenbaum,[1] N = 937.
[b]Community Comparison group: Cockerham, Sharp, Wilcox,[13] N = 252.
[c]Community Comparison group: Sayetta,[11] National Survey.
*$p < .05$.
†$p < .01$.

with their activities (Table 4); men were at somewhat increased risk ($p = .06$). All health status variables were significant when age, race, sex, and education were in the equation. As with hospital admissions, no improvement could be made on the model which considered health as a barrier, although overall health ratings showed a trend ($p = .087$). Of 107 respondents in the low-risk group, 2 (1.9 per cent) were placed in NHs; 14 of 48 high-risk persons (29.2 per cent) were placed ($\chi^2 = 23.81$, $p < .0001$).

*Discussion*

As hypothesized, elderly public housing tenants had poorer self-reported health than similarly aged community residents. Tenants commonly reported fair (40 per cent) or poor (25.8 per cent) health, and 35.5 per cent stated that health was a frequent barrier to everyday activities. For depression, depending on the criterion, between 14.5 per cent and 24.7 per cent had CES-D scores warranting psychiatric follow-up.

Our sample had a high risk for hospital admission and NH placement. The 43.8 per cent hospital admission rate observed was 2.3 times the estimate based on age alone. While poverty is also a risk factor for hospital admission, the rate in our sample is 3.4 times that of low-income persons.[5] We can find no data for a noninstitutionalized sample where both age and income are controlled simultaneously. During an entire six-year period, only 9 per cent of noninstitutionalized elderly persons were admitted to a NH or chronic disease hospital.[16] The NH placement rate in our sample (10.3 per cent) is seven times the expected rate for similarly aged community residents. These findings are impressive given that we excluded 13 persons who were either incompetent or too ill for an interview.

Poor self-reported health was a risk factor for hospital admission and NH placement, even when controlling for demographics. We found nearly twice the hospital admission rate among the 55 tenants who viewed their health as a major barrier than in those who did not (62 per cent vs. 32 per cent). The high-risk group was 15 times more likely than the low-risk group to have entered a NH during the subsequent year (29.2 per cent vs. 1.9 per cent). The data needed to calculate these probabilities are easy to obtain and may identify persons who can benefit from vigilant outpatient monitoring for deterioration in health status.

**TABLE 3—Analysis of Differences between Tenants Admitted and Not Admitted to the Hospital**

| | Hospital Admission | | | |
|---|---|---|---|---|
| | Not Admitted (N = 87) | Admitted (N = 68) | | |
| Variables | Mean ± S.D. | Mean ± S.D. | Odds Ratio[a] | Confidence Limits[a] |
| Age (years) | 71.76 ± 9.03 | 71.01 ± 10.32 | — | — |
| Education (years) | 8.85 ± 2.74 | 9.40 ± 2.73 | — | — |
| Race (% White) | 55.9 | 46.0 | — | — |
| Sex (% Female) | 71.3 | 69.1 | — | — |
| CES-D (Depression)[b] | 8.36 ± 8.13 | 12.53 ± 10.77 | 0.96 | 0.91, 0.98 |
| Overall Health Status | 2.37 ± 0.92 | 1.91 ± 0.84 | 2.06 | 1.31, 3.24 |
| Health as a Barrier | 2.18 ± 0.80 | 1.75 ± 0.84 | 3.38 | 1.66, 6.88 |
| Health Compared to Others | 2.25 ± 0.77 | 2.15 ± 0.78 | 1.23 | 0.77, 1.97 |

Hospital Admission = 1.532 − .092(Sex) − .448(Race) + .007(Age) + .057(Education) − 1.219(Health as Barrier).
a)These statistics were based on the logistic model which forced in age, race, sex, and education as covariates; 95% confidence limits are presented.
b)For CES-D scores, variances were unequal and adjustments were made accordingly.

**TABLE 4—Analysis of Differences between Tenants Placed and Not Placed in Nursing Homes**

| | Nursing Home Placement | | | |
|---|---|---|---|---|
| | Not Placed (N = 139) | Placed (N = 16) | | |
| Variables | Mean ± S.D. | Mean ± S.D. | Odds Ratio[a] | Confidence Limits[a] |
| Age (years) | 70.76 ± 9.54 | 77.31 ± 8.08 | — | — |
| Education (years) | 9.21 ± 2.71 | 8.06 ± 2.89 | — | — |
| Race (% White) | 51.8 | 37.5 | — | — |
| Sex (% Female) | 72.7 | 50.0 | — | — |
| CES-D (Depression)[b] | 9.69 ± 9.05 | 14.75 ± 12.85 | 0.93 | 0.88, 0.99 |
| Overall Health Status | 2.22 ± 0.91 | 1.75 ± 0.86 | 3.43 | 1.42, 8.26 |
| Health as a Barrier | 2.06 ± 0.84 | 1.38 ± 0.62 | 8.98 | 2.38, 34.48 |
| Health Compared to Others | 2.23 ± 0.77 | 2.00 ± 0.76 | 2.70 | 1.06, 6.90 |

NH Placement = −4.421 − 1.498(Sex) + .144(Race) + .115(Age) − .100(Education) − 2.195(Health as Barrier).

a)These statistics were based on the logistic model which forced in age, race, sex, and education as covariates; 95% confidence limits are presented.

b)For CES-D scores, variances were unequal and adjustments were made accordingly.

Two caveats need to be considered. First, access to an on-site health center may identify needs that otherwise may go undetected, thus increasing the number of hospital and NH admissions. However, given the large disparity with the national average, this explanation alone seems inadequate.

Second, although separate analyses indicate our tenants' self-reported health is similar to other elderly, public housing tenants,[7] these results are not generalizable to all elderly persons. Quite to the contrary, public housing tenants may well be more ill than similarly aged community residents. One criterion for admission to public housing is a disability or handicap.

We have chosen important outcome variables. In 1976, NH costs in the United States were $11 billion dollars.[14] At our hospital, 78 per cent of patients' total health care bill was attributed to hospitalizations, and strategies that intensify outpatient care would be the most effective in reducing the overall cost of care.[18] Our data suggest that tenants of the 385,000 public housing units[17] available for the elderly are at risk for expensive health care resource utilization and, because they live in a single site, may be amenable to cost-effective interventions.

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